New Process Keeps Biocontrols Alive Longer

Dozens of fungi and bacteria have been tested and found effective for controlling weeds that infest crops and rangeland. Unfortunately, most haven't made it out of the laboratory.

Often it's because the weed-killing microbes can't be kept alive or effective for the long-term. Stabileze (pronounced stable-ease), a new process invented by Agricultural Research Service scientists, could change that.

"Our method uses sugar to stabilize the cell membranes of the organisms," says Paul C. Quimby, Jr. He is a plant physiologist at the ARS Northern Plains Agricultural Research Laboratory in Sidney, Montana. "This approach keeps a large percentage of the organisms alive for 6 weeks to 6 months at room temperature and for at least 2 years under refrigeration," he says.

Now, some organisms can only survive a few hours without the formulation.

The sugar solution and microbes are mixed in a food processor with silica, corn oil, and another ARS invention—a water-absorbent starch known as Super Slurper. The mixture forms dispersible granules that can be applied to foliage with conventional spraying equipment. Another plus: the ingredients are cheaper and easier to work with than the sodium alginate and calcium salts that are commonly used to make similar granules.

ARS has received patent application No. 08/695,249 on the process. Quimby developed Stabileze with ARS plant pathologist Anthony J. Caesar; former ARS botanist Jennifer L. Birdsall, who now works for USDA's Forest Service; ARS chemist William J. Connick, Jr.; ARS plant pathologists Clyde D. Boyette and Nina K. Zidack; and plant pathologist William E. Grey, who is at Montana State University in Bozeman.

Ideally, commercial manufacturers and users would like a 2-year survival rate at room temperature, to save on refrigeration costs. But Stabileze is a step in the right direction.—By **Kathryn Barry Stelljes,** ARS.

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Glomalin—Soil's Superglue

Agricultural Research Service soil scientist Sara E. Wright has discovered a unique fungal protein that may be the primary glue that holds soils together.

She named the gooey protein "glomalin" for Glomales, the scientific name for the group of common root-dwelling fungi that secrete the protein through hairlike filaments called hyphae. The fungal hyphae are found worldwide on the roots of many plants. Glomalin sloughs off of the hyphae and finds its way into soil.

"It coats soil particles and may be what holds them together in the stable structures we call aggregates," says Wright. "Farmers and gardeners know them as the small grains of soil that sift through their hands and suggest to them that the soil has good structure."

Wright knew she had something unique when it took up to 90 minutes in a heat-sterilizing autoclave to free glomalin from the hyphae. "That's unheard of in the soil sciences, although an hour or more of autoclaving has been used to free proteins from some yeasts. With that level of persistence, we knew glomalin must stay in the soil, too."

So Wright began searching soils. She started with a dozen eastern soils and found that with the measuring technique she used, glomalin was as high as 2 percent of the total weight of a soil aggregate. When she moved on to test soils from the West and Midwest, she found levels were dramatically lower, although still abundant. She has also found glomalin in soil samples sent from several cooperators throughout the world.

"It may be that the higher glomalin levels explain why eastern soils have stronger structural stability than western soils," says Wright. "Knowing about glomalin gives us a reason to alter farming practices to raise or maintain glomalin levels. For example, tillage tends to lower glomalin levels. We found that soil from no-till corn plots had more glomalin and higher aggregate stability than soil from tilled plots."—By **Don Comis,** ARS.

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